2013–14
ANNUAL REPORT

PUBLISHED JUNE 2014

Alberta Innovates Bio Solutions

Alberta Innovates Bio Solutions

Alberta Canada

Funded by the Government of Alberta

ALBERTA INNOVATES - BIO SOLUTIONS
2013–14 Annual Report

Published June 2014
Printed in Canada

The document is available online at www.bio.albertainnovates.ca by searching for "2013–14 Annual Report."

Contents

1. Executive Summary 1
2. Accountability Statement 3
3. Management's Responsibility for Reporting 3
4. Message from the Board Chair 4
5. Performance Measurement – Reporting on Results 5
6. Management's Discussion and Analysis 20
7. Operational Overview 21
8. Audited Financial Statements 22

1. Executive Summary

At Alberta Innovates Bio Solutions (AI Bio), we're in the business of turning challenges into opportunities.

Alberta's agriculture, food, and forest industries have considerable opportunity to drive economic growth and diversification for Alberta, but much needs to be done to catalyze this growth. AI Bio's investments focus on pursuing our best opportunities and on providing scientific knowledge that can help the Government of Alberta (GOA) develop related and necessary public policy.

Because AI Bio is a bridge between the private sector, research institutions, government, and others in the research system, we play a key role in fostering a rich innovation infrastructure and a research and development culture of excellence in the biosectors. In our fourth full year of operation, the wide-ranging expertise of our Board has guided our allocation of research funding in our priority areas of sustainable production, food innovation, bioindustrial innovation, ecosystem services, and prion and prion-like neurological diseases.

Using the performance measures developed in 2012–13, AI Bio assessed this year's achievement of immediate outputs (results occurring directly due to our influence and support) and immediate outcomes (areas of impact to which we contributed). These outcomes and outputs are summarized in a table for each priority area. Below each table, key achievements in that area are listed along with the long-term outcomes and initiatives each achievement supports.

The following are examples of AI Bio's significant achievements during 2013–14:

- A world-class database was established to improve the transfer of genomic technology and data to the Canadian beef cattle industry.
- Eight field pea and one faba bean variety were registered, and pedigreed seed status was obtained for three faba bean entries, with desired traits including improved yield, resistance to lodging, maturity, and low tannins.
- The Bioindustrial Research and Innovation Program was launched. Project activities include developing biochar adsorbents, agrifibre-based concrete additives, massive wood plate building components, cellulose nanocrystal–reinforced foams, polyolefin nanocomposites, and standards for building materials and systems.
- A two-year study was conducted to improve the quality of beta-glucan fibre concentrate from oats and barley using superheated steam heating and conventional oven heating at lab and pilot scale. Functional food products enriched with barley and oat beta-glucan were also developed. This project resulted in the filing of a patent for a beta-glucan extraction process.
- A demonstration project by the Canadian Fertilizer Institute, titled Farming 4R Land, reached many producers in the province. The project enhances understanding about the link between management practices and greenhouse gas (GHG) emissions from fertilizer applications. Further, an economic analysis conducted as a part of the demonstration project showed a strong correlation between sound environmental practice and farm gate returns.
- In October 2013, AI Bio and the Climate Change and Emissions Management Corporation (CCEMC) co-hosted the first Biological Solutions Forum, focusing talks and discussion on ways that biological systems could be applied to reduce the province's net GHG emissions.

- Along with Silvacom Ltd., the Oil Sands Leadership Initiative, the Alberta Biodiversity Monitoring Institute, Alberta Innovates Technology Futures, and other stakeholders, AI Bio completed a proof of concept focusing on land disturbance, restoration, and ecosystem services. The purpose of the initiative was to understand the processes, data, and information required to offset land disturbance through reclamation, biodiversity offsets, and other instruments.

- A project at the University of Alberta discovered that in many types of prion infections, the cellular prion protein is reduced early on. This finding suggests a host protective response and a new point of intervention to slow down the progress of prion diseases.

- Researchers at the University of Calgary found a means to detect chronic wasting disease prions in urine.

- The Alberta Prion Research Institute formed a partnership with the German Center for Neurodegenerative Diseases. Recent evidence shows that the protein misfolding that occurs in prion diseases is similar to the protein misfolding that occurs in human neurodegenerative diseases such as Alzheimer's and Parkinson's.

As of March 31, 2014, AI Bio has been managing 155 active projects focused on providing the knowledge, tools, and technologies to support agriculture, food, and forest industries in Alberta. This investment portfolio of more than $58 million over the lifetime of our active projects spans a wide array of research in priority areas.

In the 2013–14 financial statements, the Statement of Financial Position shows net assets of $8.483 million and cash and cash equivalents of $16.655 million, which includes (but is not limited to) $4.053 million in cash for the Alberta Prion Research Institute. Cash has decreased by $2.964 million from the 2012–13 reported balance. Because we are able to retain resources into other fiscal years, we can plan for longer-term opportunities in our areas of focus. The $4.232-million increase in unearned revenue is primarily due to a number of partners' increased investment in AI Bio for specific programming.

In the 2013–14 Statement of Operations, revenues of $17.865 million were received and $21.837 million in expenses were committed, resulting in a net operating deficit of $3.972 million, which reduces the operating surplus ($12.455 million) carried forward from previous years.

While the Alberta Innovates corporations are assigned responsibility for advancing research, innovation and commercialization in discrete sectors, AI Bio partners with its Alberta Innovates colleagues in areas of common interest. These areas include water, food and beverage innovation and food safety bioproducts, greenhouse gas mitigation, land reclamation, climate change, ecosystem services, and health.

Strategic collaboration is a cornerstone of AI Bio's operations. Connections and relationships enhance our ability to build on each other's strength, increase access to unique capacity, leverage resources, and avoid duplication. We routinely seek partners with expertise and capacity to deliver results. Each business line within AI Bio works with its partners in unique, creative ways. In addition to our Alberta Innovates collaborations, we work with partners in the private sector, academia, non-governmental organizations, and governments (municipal, provincial, and federal).

AI Bio acknowledges the GOA's stated intent to continue to improve the relevance, effectiveness, and efficiency of the province's innovation system, and we continue to work with the GOA in pursuing this goal. Our programs and partnerships have demonstrated a history of good choices, and we expect to continue delivering needed research and innovation in Alberta. We submit this annual report in the belief that it describes the initiatives and investments that Alberta's agriculture, food, and forest industries require to be profitable and competitive—no matter what the architecture of Alberta's innovation ecosystem looks like in the future.

2. Accountability Statement

AI Bio's annual report for the year ended March 31, 2014, was prepared under the Board's direction in accordance with the Alberta Research and Innovation Regulation and the ministerial guidelines established pursuant to the *Alberta Public Agencies Governance Act (APAGA)*, proclaimed June 12, 2013, and the *Fiscal Management Act*, proclaimed April 1, 2013. All material economic, environmental, or fiscal implications of which we are aware have been considered in the preparation of this report.

ORIGINAL SIGNED BY:

Art Froehlich
CHAIR

3. Management's Responsibility for Reporting

Alberta Innovates Bio Solutions' management is responsible for the preparation, accuracy, objectivity, and integrity of the information contained in the annual report, including the financial statements, performance results, and supporting management information. Systems of internal control are designed and maintained to produce reliable information that meets reporting requirements and to ensure that transactions are executed in accordance with all relevant legislation, regulations, and policies; that reliable financial records are maintained; and that assets are properly accounted for and safeguarded. The annual report has been approved by the Board of Directors and is prepared in accordance with ministerial guidelines.

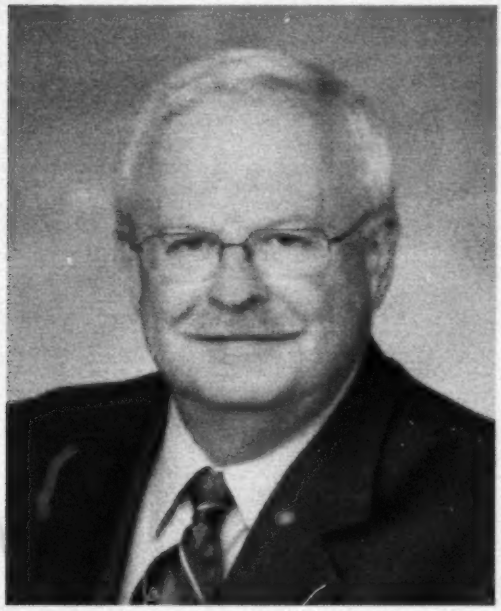
The Auditor General of the Province of Alberta, the corporation's external auditor appointed under the *Auditor General Act*, performs an annual independent audit of Alberta Innovates Bio Solutions' financial statements in accordance with Canadian auditing standards.

ORIGINAL SIGNED BY:

Stan Blade
CHIEF EXECUTIVE OFFICER

Alberta Innovates Bio Solutions

4. Message from the Board Chair



Working with partners, AI Bio's core business is to identify, coordinate, and fund leading-edge research initiatives. As of March 31, 2014, AI Bio managed 155 active grant agreements focused on providing knowledge, tools, and technologies to grow and diversify the agriculture, food, and forest industries in Alberta. In total, these industries generated sales of $26 billion in 2012.

Our leadership in catalyzing Alberta's considerable intellectual, physical, logistical, and financial resources not only offers efficiencies but sparks the type of creative problem solving needed to address the complex and important challenges that Alberta faces in the agriculture, food, and forest sectors.

Alberta's agriculture, food, and forest industries have considerable opportunity to drive economic growth and diversification for Alberta, but much needs to be done to catalyze this growth. AI Bio's investments focus on supporting strong potential and on providing scientific knowledge that can help the Government of Alberta develop related and necessary public policy.

I want to extend my appreciation to the Board of Directors and everyone at AI Bio for their hard work and dedication to cutting-edge research and growth within the industries we serve.

ORIGINAL SIGNED BY:

Art Froehlich
CHAIR

5. Performance Measurement – Reporting on Results

AI Bio's mandate is to lead and coordinate research and innovation that support the growth and diversification of Alberta's agriculture, food, and forest sectors. Because AI Bio is a bridge between the private sector, research institutions, government, and others in the research system, we play a key role in fostering a rich innovation infrastructure and a research and development culture of excellence in the biosectors.

In delivering on the *2013–16 Business Plan* over the past year, AI Bio supported investments within five priority research and innovation areas: sustainable production, advancing the bioeconomy (renamed bioindustrial innovation), food innovation, ecosystem services, and management of prion and prion-like neurological diseases.

Over 2012–13, we developed performance measures for the effectiveness of our investments. These same measures have been used for 2013–14. We evaluated AI Bio–supported projects, programs, or initiatives for which the final report was received by the end of 2013 or which were otherwise considered closed. Using the performance measures, we assessed our achievement of immediate outputs (results occurring directly due to our influence and support) and immediate outcomes (areas of impact to which we contributed).

In the following section, these results are summarized in a table for each priority area. Below each table, key achievements in that area are listed along with the long-term outcomes and initiatives each achievement supports.

In a number of instances, the achievements reported are the culmination of research programs and collaborations that were initiated in previous years, reflecting the legacy investments brought into AI Bio when it was formed in 2010.

Alberta Innovates Bio Solutions

Business Line: Sustainable Production

Goal 1: Sustainable Agriculture, Food, and Forest Production

Long-Term Outcomes

1. **Competitive market-driven traits and products**
2. **Sustainable production systems**

Initiatives

Support research and innovation to:

1.1 **Optimize environmentally sustainable production systems in agriculture and forestry**

1.2 **Increase the yields of Alberta's cereal and pulse crops by improving the efficiency of nutrient and water use and resistance to pests such as weeds, pathogens, and insects**

1.3 **Identify and develop new traits in crops to enhance their value for food and animal feed products or identify new crops that can be adapted to Alberta's growing conditions**

1.4 **Improve efficiency of crop and livestock production by applying emerging technologies such as genomics**

1.5 **Develop improved forest species adapted to a changing climate and the demand for qualities required for higher-value products**

1.6 **Inform management practices for species at risk, forest pests, and reclamation of disturbed boreal forest lands**

2.0 **Continue AI Bio investment in research, development, knowledge translation, and commercialization activities at two Alberta Innovates Centres: Livestock Gentec and Phytola**

Results Category	Performance Measure	Actual Results 2013–14
Projects	The number of projects, programs, or initiatives supported by AI Bio for which the final report was received by the end of 2013 or which are otherwise considered closed, and which were evaluated for achievement of outputs or outcomes as reported in the table below	15
Immediate Outcomes		
Knowledge that is likely to lead to a new or improved product, process, or service, or improved market access	The number of potential or actual patents, licence agreements, registrations, etc. (e.g., *Registered a new dry-bean cultivar*)	14
Knowledge that is likely to lead to practice change	The number of potential or actual changes in practice	4
Knowledge that resulted in significant new directions in science or innovation	The number of confirmed proofs of concept, new avenues opened for exploration, new memoranda of understanding, etc. (e.g., *Identified 300 organic compounds residing in the soil throughout the growing season of wheat and canola, which may lead to new farming practices and products*)	12
Immediate Outputs		

Highly qualified personnel developed through our projects, programs, and initiatives	The number of individuals involved on a project, program, or initiative who are supported by a grant or contract and who are undergraduate students, graduate students, post-doctoral fellows, or post-secondary graduates with a diploma or degree	262
Knowledge management that occurred with industry, government, and others	Over the life of a project, program, or initiative, the number of seminars or workshops coordinated, presentations delivered, articles published in non-academic publications, newsletter editions issued, active websites developed, crop walks or tours coordinated, etc. for which the audience was from industry, government, or other sectors	169
Knowledge management that occurred with academia	Over the life of a project, program, or initiative, the number of published peer-reviewed papers, abstracts, or book chapters; scientific conference program or poster presentations; or other endeavours for which the audience was mainly from academia	402

Sustainable Production — Key Achievements in 2013–14

- AI Bio supported a four-year research project that addressed the critical need to optimize beef production to improve feed efficiency and carcass quality traits through genomics. The research succeeded in quantifying relationships between genetic markers and phenotypes in cattle. This project also established a world-class database to improve the transfer of genomic technology and data to the Canadian beef cattle industry. (Relevant to long-term outcomes 1 and 2 and initiatives 1.1, 1.2, and 1.6)

- Plants have a natural ability to tolerate stress and to adapt efficiently to changing environments. A project investigated effects of biotic stress (bacteria, fungi, virus) and abiotic stress (cold, heat, drought, etc.) on plants to determine how plants adapt to stress in successive generations and to decipher how genetic factors contributed to the adaptation. The research illustrated that through epigenetic mechanisms, plants are able to cope with stress in different ways and pass down the memory of exposure to their progeny. (Relevant to long-term outcomes 1 and 2 and initiatives 1.1, 1.2, 1.3, and 1.6)

- Cool-season pulse crops, including faba bean and field pea breeding cultivars, were evaluated at multiple locations to select for lines with desired characteristics. The results led to the registration of eight field pea and one faba bean variety and pedigreed seed status of three faba bean entries, with desired traits including improved yield, resistance to lodging, maturity, and low tannins. (Relevant to long-term outcomes 1 and 2 and initiatives 1.1, 1.2, and 1.3)

- Canada is the largest global producer and exporter of peas. With funding from AI Bio and other partners, a project was undertaken to study an infectious nematode species in peas. The parasitic version of this nematode can cause crop losses of 60–80%. Genetic studies and seed analysis were able to demonstrate the nematode present in pea fields in the prairies to be a non-quarantine species, resulting in updated government protocols and increased assurance of the quality of pea exports. (Relevant to long-term outcomes 1 and 2 and initiatives 1.1, and 1.2)

- A five-year project supporting the Alberta Innovates Centre, Livestock Gentec was completed in 2013. The project's main goals were to provide genomic solutions across the livestock value chain to improve the global competitiveness of Canada's livestock industry. Livestock Gentec developed 49 research initiatives spanning production efficiency, meat quality, animal health, and food safety. Major achievements include developing a commercial feed efficiency genomics panel to reduce feed costs, identifying gene mutations associated with meat tenderness, and using genomic screening tools to identify pigs resistant to major swine diseases. In addition to research projects, 11 knowledge transfer and commercialization activities were undertaken, including extension services to producers, the Canadian Cattle Genome Project, and the

establishment of a DNA laboratory service, Delta Genomics. (Relevant to long-term outcomes 1 and 2 and initiatives 1.1, 1.2, 1.3, and 2.0)

- The Alberta Innovates Phytola Centre was established in April 2010 with the aim of engaging in commercially focused research to develop novel and market-responsible specialty oils. This goal is achieved through applying genetic tools to increase oil content of Canada's oilseed crops, advancing the development of oils with punicic acid and other high-value unsaturated fatty acids, and developing new technology platforms, including a high-throughput screening assay, to increase oilseed content. Phytola has made significant advances in developing new traits for canola improvement and modifying seed oil profiles to create new products with enhanced nutritional and health benefits. (Relevant to long-term outcomes 1 and 2 and initiatives 1.1, 1.2, 1.3, and 2.0)

- Launched in 2002, the Agriculture Funding Consortium is a one-window funding portal that consists of 15 agricultural research funding organizations in Alberta, including AI Bio. In 2013–14, AI Bio selected 14 projects for investment from the consortium process. The projects focused on studying blood biomarkers for quality traits in cattle, developing new soybean cultivars for Alberta, expanding nitrogen fixation capabilities, increasing winter wheat quality and agronomy, developing blight-resistant plant lines, and advancing agronomic practices in pea, wheat, and barley. (Relevant to long-term outcomes 1 and 2 and initiatives 1.1, 1.2, 1.3, and 1.4)

- Changes in climatic conditions will likely impact the structure and health of Alberta's forested lands by modifying their vegetation distribution and resistance and resilience to pest attacks. A five-year project predicted future climatic conditions of the Foothills region using remote sensing techniques. This data was compared to past climatic conditions and used as a baseline to project distribution patterns of selected forest plant species, including the 17 plants most commonly consumed by grizzly bears. It was found that bear plant foods will likely migrate uphill, which may result in higher vulnerability across bear populations at lower elevations of the southern Canadian Rocky Mountains, where human-bear conflicts are most likely to occur. The predicted climatic conditions were also used to estimate mountain pine beetle (MPB) population dynamics in habitats climatically suitable to the beetle. The vast majority of the pine-dominated stands in the area are projected to become highly suitable and susceptible to MPB attacks by the middle of this century. (Relevant to long-term outcome 2 and initiatives 1.5 and 1.6)

- Projects in the area of sustainable production benefited from a broad range of partners, including other organizations in the Alberta Innovates group; the Universities of Alberta, Calgary, Lethbridge, Ottawa, and Guelph; Carleton University; Alberta Environment and Sustainable Resources; Foothills Research Institute; Agriculture and Agri-Food Canada; Alberta Agriculture and Rural Development; Alberta Livestock and Meat Agency; Alberta Crop Industry Development Fund; Alberta Canola Producers Commission; Alberta Pulse Growers Commission; Alberta Milk; Alberta Chicken Producers; Alberta Barley Commission; Alberta Wheat Commission; Canadian Food Inspection Agency; Canadian International Grains Institute; Western Grains Research Foundation; and the University of Alberta's Poultry Research Centre, Dairy Research Technology Centre, Alberta Innovates Phytola Centre, and Livestock Gentec Alberta Innovates Centre. (Relevant to long-term outcome 2 and initiatives 1.1 and 2.0)

- As at March 31, 2014, the Sustainable Production team was managing 49 active projects, 23 of which were in the area of market-driven products, and 26 of which were in the area of agriculture and forest sustainability.

Business Line: Advancing the Bioeconomy (Renamed Bioindustrial Innovation)

Goal 2: New Chemicals, Materials, and Energy from Biomass

Long-Term Outcomes

1. New bioindustrial products and processes
2. Bioindustrial sector growth

Initiatives

1. Facilitate advancements in science and innovation that allow the development of bioindustrial growth opportunities in four broad areas: biomaterials, biocomposites, biochemicals, and bioenergy including liquid transportation fuels
2. Provide data and analysis for science-based policy recommendations that will improve policy or reduce policy constraints that affect bioindustrial development in Alberta
3. Develop relationships and networks to spur cross-sector innovation among agriculture, forest, and oil and gas sectors, and also communities (e.g., Bioeconomy Alberta Team, Alberta Biomaterials Development Centre, Biorefining Conversions Network, and Canadian Bioenergy Association)
4. Support establishment of a biorefinery cluster

Results Category	Performance Measure	Actual Results 2013–14
Projects	The number of projects, programs, or initiatives supported by AI Bio, for which the final report was received by the end of 2013 or which are otherwise considered closed, and which were evaluated for achievement of outputs or outcomes as reported in the table below	9
Immediate Outcomes		
Knowledge that is likely to lead to a new or improved product, process, or service, or improved market access	The number of potential or actual patents, licence agreements, registrations, etc.	3
Knowledge that is likely to lead to policy or regulation change	The number of potential or actual changes in policy or regulation	3
Knowledge that resulted in significant new directions in science or innovation	The number of confirmed proofs of concept, new avenues opened for exploration, new memoranda of understanding, etc. (e.g., *Identified 300 organic compounds residing in the soil throughout the growing season of wheat and canola, which may lead to new farming practices and products*)	5
Immediate Outputs		
Highly qualified personnel developed through our projects, programs, and	The number of individuals involved on a project, program, or initiative who are supported by a grant or contract and who are undergraduate students, graduate students, post-doctoral fellows, or post-secondary graduates with a diploma or	76

initiatives	degree	
Knowledge management that occurred with industry, government, and others	Over the life of a project, program, or initiative, the number of seminars or workshops coordinated, presentations delivered, articles published in non-academic publications, newsletter editions issued, active websites developed, crop walks or tours coordinated, etc. for which the audience was from industry, government, or other sectors	30
Knowledge management that occurred with academia	Over the life of a project, program, or initiative, the number of published peer-reviewed papers, abstracts, or book chapters; scientific conference program or poster presentations; or other endeavours for which the audience was mainly from academia	84

Bioindustrial Innovation — Key Achievements in 2013–14

- The Advanced Materials and Chemicals Program (AMCP) was launched in 2010 to provide assistance to Alberta companies looking to use Alberta biomass to produce new products for the marketplace. Products range from personal care and cosmetics to bioplastics and biofuels. In 2013–14, two of the four recipients of funding under the AMCP neared project completion, having consolidated operations in Alberta and constructed new processing facilities. Two other recipients have made significant strides toward commercialization. (Relevant to long-term outcomes 1 and 2 and initiative 1)

- In 2013 the Bioindustrial Research and Innovation Program was launched. The focus of this program is green building materials, components, and technologies; biomaterials based on cellulose, lignin, and hemicellulose; and biocomposites using natural agriculture or forestry fibres. Projects funded under this program are now well underway. Project activities include developing biochar adsorbents, agrifibre-based concrete additives, massive wood plate building components, cellulose nanocrystal–reinforced foams, polyolefin nanocomposites, and standards for building materials and systems. (Relevant to long-term outcomes 1 and 2 and initiatives 1 and 2)

- Research networks and research chairs focused on addressing the needs of Alberta industry are an excellent way to develop highly qualified people and to assist Alberta companies. Several research networks are supported through the AI Bio bioindustrial innovation business line, including the Biorefining Conversions Network (U of A), the NEWBuildS Network (UNB), the Industrial Research Chair in the Industrialization of Building Construction (U of A), the Industrial Research Chair in Energy and Environmental Systems Engineering (U of A), and the Athena Chair in Life Cycle Assessment (U of C). These networks provide opportunities for young researchers to work hand in hand with business people to identify issues and develop solutions. (Relevant to long-term outcome 2 and initiative 3)

- Several new projects were initiated, including new uses of cellulose nanocrystals; new uses of lignin, biobased plastics, supercapacitors, and nanofoams; enhanced oil recovery through microbials; and phase two of a major initiative focused on the use of biocomposites in automobile manufacturing. (Relevant to long-term outcomes 1 and 2 and initiative 1)

- AI Bio continued to play a leadership role through involvement on numerous committees and boards, including the Alberta Forest Products Roadmap Steering Committee, Bioeconomy Alberta Team Alberta, CanBio, the CSA Technical Committee on Sustainable Forest Management, several CSA wood products technical committees and the CSA Technical Committee for Nanocrystalline Cellulose, the Ontario BioAuto Council, IEA Task 39 and Task 43 Committees, the Alberta Chamber of Resources, and other standard development committees. (Relevant to long-term outcome 2 and initiatives 3 and 4)

Business Line: Food Innovation

Goal 3: Growth and Diversification of Alberta's Food Industry

Long-Term Outcomes

1. Competitive food ingredients, food products, beverages, and supplements produced by Alberta businesses
2. New technologies, products, and processes to control food-borne pathogens
3. Innovative food processing and packaging technologies

Initiatives

1. Invest in research and innovation leading to new or improved food ingredients, food products, beverages, or supplements that:
    - 1.1 Are competitive in the domestic and global marketplace
    - 1.2 Respond to domestic and/or international consumer demand
    - 1.3 Add value to Alberta livestock and crop commodities
    - 1.4 Promote wellness and/or can be used to prevent/treat chronic diseases
    - 1.5 Contribute to global food security
2. Invest in research and innovation that:
    - 2.1 Contribute to reduction of pathogenic *E. coli*, *Salmonella spp.*, *Listeria spp.*, and *Campylobacter spp.* in Alberta livestock, crops, and food and beverage products
    - 2.2 Support development of new food safety policy
    - 2.3 Enhance consumer confidence
    - 2.4 Lead to enhanced market access
3. Facilitate research, development, commercialization, or adoption of innovative platform, food processing, and packaging technologies by Alberta businesses

Results Category	Performance Measure	Actual Results 2013–14
Projects	The number of projects, programs, or initiatives supported by AI Bio, for which the final report was received by the end of 2013 or which are otherwise considered closed, and which were evaluated for achievement of outputs or outcomes as reported in the table below	8
Immediate Outcomes		
Knowledge that is likely to lead to a new or improved product, process, or service, or improved market access	The number of potential or actual patents, licence agreements, registrations, etc.	9
Knowledge that is likely to lead to practice change	The number of potential or actual changes in practice	3
Knowledge that resulted in significant new directions in science or innovation	The number of confirmed proofs of concept, new avenues opened for exploration, new memoranda of understanding, etc. (e.g., *Identified 300 organic compounds residing in the soil throughout the growing season of wheat and canola, which may lead to new farming practices and products*)	4

Immediate Outputs		
Highly qualified personnel developed through our projects, programs, and initiatives	The number of individuals involved on a project, program, or initiative who are supported by a grant or contract and who are undergraduate students, graduate students, post-doctoral fellows, or post-secondary graduates with a diploma or degree	144
Knowledge management that occurred with industry, government, and others	Over the life of a project, program, or initiative, the number of seminars or workshops coordinated, presentations delivered, articles published in non-academic publications, newsletter editions issued, active websites developed, crop walks or tours coordinated, etc. for which the audience was from industry, government, or other sectors	250
Knowledge management that occurred with academia	Over the life of a project, program, or initiative, the number of published peer-reviewed papers, abstracts, or book chapters; scientific conference program or poster presentations; or other endeavours for which the audience was mainly from academia	248

Food Innovation — Key Achievements in 2013–14

- Extensive analysis of the global food and beverage processing industry resulted in the development of a Food Innovation Plan designed to focus AI Bio investments. Research and innovation supporting new ingredients, food and beverage products, functional foods, and nutraceuticals, as well as food safety, were identified as the greatest opportunities to contribute to industry growth. (Relevant to long-term outcomes 1, 2, and 3 and initiatives 1.0, 1.1, 1.2, 1.3, 1.4, 2.1, 2.3, and 2.4)

- The Value-Added Meats Program funded by AI Bio and the Alberta Livestock and Meat Agency was a five-year program dedicated to supporting Alberta's value-added meat industry. More than 30 professionals from Olds College, the University of Alberta, Alberta Agriculture and Rural Development, and Agriculture and Agri-Food Canada have collaborated on 110 research projects throughout the meat production and processing continuum. Collectively, they have published over 170 manuscripts, made more than 220 presentations at scientific and industry meetings, and trained 55 highly qualified personnel. (Relevant to long-terms outcomes 1 and 2 and initiatives 1.0, 1.1, 1.2, 1.3, 1.4, 2.1, 2.2, 2.3, and 2.4)

- With funding from AI Bio, a study was conducted to evaluate pulse crops as a tool for the treatment of type 2 diabetes. It was concluded that the pea seed coats of three Alberta-grown pea cultivars, Canstar, Solido, and Courier, have beneficial effects on blood sugar control. The studies provide a strong rationale for using pea seed coats as food ingredients, as well as for promoting pulse products as healthy dietary additions for everyone, including people with type 2 diabetics. (Relevant to long-term outcome 1 and initiatives 1.0, 1.2, 1.3, and 1.4)

- Choline is a nutrient found mainly in eggs, liver, dairy, meat, and fish that is essential to fetal brain and spinal cord development and also important for immune function. A study measured the choline content of a wide variety of Alberta foods and assessed choline intake in a group of 50 pregnant Alberta women. The study found that only 16% had an adequate intake of choline, and that the recommended minimum could be met by consuming only one egg per day. (Relevant to long-term outcome 1 and initiatives 1.0, 1.1, 1.2, 1.3, 1.4, and 1.5)

- Alberta is a major producer of potatoes in Canada. With the increased demand for processed potatoes in the fast-food industries, a considerable amount of peel waste is generated. A study illustrated that value-added functional compounds for food and non-food uses can be recovered from potato peels by subcritical fluid technology. The project also resulted in the development of a new biofilm that is being

protected by a patent application. (Relevant to long-term outcomes 1 and 3 and initiatives 1.0, 1.1, 1.2, 1.3, 1.4, and 3)

- Barley and oat beta-glucan have a number of human health benefits but require specific dosage levels for functional foods as recommended by Health Canada and the United States Food and Drug Administration. A two-year study was conducted to improve the quality of beta-glucan fibre concentrate from oats and barley using super-heated steam heating and conventional oven heating at lab and pilot scale. Functional food products enriched with barley and oat beta-glucan were also developed. This project resulted in the filing of a patent for a beta-glucan extraction process. (Relevant to long-term outcome 1 and initiatives 1.0, 1.1, 1.2, 1.3, and 1.4)

- Spent hens are considered an agricultural waste and could result in environmental concerns or disposal costs leading to increased cost of poultry production. Meanwhile, canola meal is largely underutilized, as are triticale distiller grains. A project demonstrated that use of protein-containing agricultural waste and canola by-products could be used in adhesives for use in construction and furniture manufacturing as green building materials. This project resulted in the filing of two patents for adhesives made from canola meal and spent hens. (Relevant to long-term outcome 3 and initiative 3)

- Mechanically separated poultry meat, a by-product of the processing of poultry meat, is considered to be a low-value product for the poultry industry. A study assessed the feasibility of recovering valuable compounds, such as proteins, and reincorporating them into further processed meat products, such as chicken burgers. Results indicated that the poultry protein isolate can potentially replace the soy protein isolate used today and may in the future be used as a substitute for lean meat in selected poultry products. Poultry protein isolate offers the opportunity to develop innovative marketable products with improved functional and sensory properties. (Relevant to long-term outcome 1 and initiatives 1.0, 1.1, 1.2, and 1.3)

- High-pressure processing (HPP) technology was assessed as a tool to reduce salt levels in processed meat products and to extend shelf life. The project demonstrated that HPP can extend the shelf life of ready-to-eat meats without compromising quality. The extended shelf life allows expanded market access, increased shipping distances, and enhanced product competitiveness. Trials performed to develop natural, nitrite-free, low-salt processed meat products achieved the targeted levels of sodium in some nitrite-free processed meat products without compromising microbial stability. At certain levels, salt reduction combined with salt replacers led to lower levels of consumer acceptability due to off flavours. The results of this project can be used by Canadian meat processors in developing reduced-salt products. (Relevant to long-term outcomes 1, 2, and 3 and initiatives 1.0, 1.1, 1.2 1.3, 1.4, 2.1, 2.3, 2.4, and 3)

- As of March 31, 2014, the Food Innovation Team managed 30 active projects, 13 of which were in the area of food safety, and 17 in the area of competitive food ingredients, food products, beverages and supplements, and innovative food processing and packaging.

Alberta Innovates Bio Solutions

Business Line: Ecosystem Services

Goal 4: Integrated Land and Environmental Management

Long-Term Outcomes

1. Interdisciplinary science informing policy
2. Sustainable development and green growth
3. Cumulative effects management
4. Environmental innovation
5. Documenting environmental integrity

Initiatives

1. Deliver a biological greenhouse gas management program and projects, in partnership with the Climate Change and Emissions Management Corporation (CCEMC), to reduce greenhouse gas emissions (GHG) or increase sequestration of carbon:
    - 1.1 Invest in demonstration projects related to reducing direct emissions for forest woodland operations, reducing methane emissions from beef livestock using integrated management strategies, enhancing carbon sequestration in disturbed landscapes, and integrating waste management with nutrient recovery
    - 1.2 Invest in research and development projects
2. Create a science-based value proposition for a market-based approach to enhancing ecosystem services in Alberta by investing in innovation (science, knowledge, systems, and business models) and creating institutional capacity:
    - 2.1 Develop an ecosystem services assessment protocol to assess the supply of ecosystem services on any given landscape
    - 2.2 Establish a credible open-source data and information management system to inform land-use and management decisions
    - 2.3 Lead development and delivery of multidisciplinary, cross-sector, applied proofs of concept
    - 2.4 Enable the Centre for Market-Based Instruments to collaboratively advance knowledge on markets and on the use of market-based instruments, as well as socioeconomic knowledge
    - 2.5 Invest in cross-sector, interdisciplinary research and development initiatives
    - 2.6 Establish a global network for ecosystem services and market-based instruments
    - 2.7 Catalyze knowledge exchange through support for events and activities that build common understanding and approaches across sectors and disciplines

Results Category	Performance Measure	Actual Results 2013–14
Projects	The number of projects, programs, or initiatives supported by AI Bio, for which the final report was received by the end of 2013 or which are otherwise considered closed, and which were evaluated for achievement of outputs or outcomes as reported in the table below	8
Immediate Outcomes		
Knowledge that is likely to lead to practice change	The number of potential or actual changes in practice	8
Knowledge that is likely to lead	The number of potential or actual changes in policy or regulation	3

to policy or regulation change		
Knowledge that resulted in significant new directions in science or innovation	The number of confirmed proofs of concept, new avenues opened for exploration, new memoranda of understanding, etc. (e.g., *Identified 300 organic compounds residing in the soil throughout the growing season of wheat and canola, which may lead to new farming practices and products*)	2
Immediate Outputs		
Knowledge management that occurred with industry, government, and others	Over the life of a project, program, or initiative, the number of seminars or workshops coordinated, presentations delivered, articles published in non-academic publications, newsletter editions issued, active websites developed, crop walks or tours coordinated, etc. for which the audience was from industry, government, or other sectors	7
Knowledge management that occurred with academia	Over the life of a project, program, or initiative, the number of published peer-reviewed papers, abstracts, or book chapters; scientific conference program or poster presentations; or other endeavours for which the audience was mainly from academia	5

Ecosystem Services — Key Achievements in 2013–14

- The Canadian Fertilizer Institute's demonstration project Farming 4R Land has reached many producers in the province, enhancing understanding about the link between management practices and GHG emissions from fertilizer applications. Further, an economic analysis conducted as a part of the demonstration project showed a strong correlation between sound environmental practice and farm gate returns. (Relevant to long-term outcomes 1 and 2 and initiative 1.1)

- Early results arising from the demonstration project Protocol Validation Studies provided insights to government and to offset protocol developers. Interim and final reports will include tools to support offset aggregators and farm managers. (Relevant to long-term outcomes 1 and 2 and initiative 1.1)

- In October 2013, AI Bio and the CCEMC co-hosted the first Biological Solutions Forum, focusing talks and discussion on ways that biological systems could be applied to reduce the province's net GHG emissions. As a result of positive feedback from the 120 "by invitation only" participants, the CCEMC requested a second such forum, which will be held in October 2014. (Relevant to long-term outcomes 1 and 2 and initiatives 2.5 and 2.7)

- One key highlight of the Biological Solutions Forum was the announcement by the CCEMC of a call for expressions of interest (EOI#9) for "biological"' projects, with a total of $40 million available to support innovative projects. The Biological GHG Management Program supported the delivery of the CCEMC call, which closed in February 2014 with 82 applications. A short list of projects will be selected to be developed into full project proposals. These will be considered by the CCEMC board in late May 2014, and successful projects are expected to get off the ground in spring 2015. (Relevant to long-term outcomes 1, 2, and 4 and initiatives 1.2 and 2.5)

- With funding from the CCEMC and in collaboration with AI Bio, the Biological GHG Management Program initiated an additional 8 research and demonstration projects, bringing the current active number to 12. Each of these projects was approved by the CCEMC for funding and will begin in 2014 once contracting is completed; results will begin to emerge in late 2014 and 2015. (Relevant to long-term outcomes 2 and 4 and initiatives 1.1 and 1.2)

- Research projects are intended to address specific knowledge gaps relating to our ability to achieve GHG mitigation or to successfully measure or model impacts. In one such project, Ducks Unlimited Canada

researchers will work to include wetland carbon values into spatially explicit land-use planning tools to ensure that emissions from wetlands are measured and modelled accurately and that the sequestration potential of these regions is incorporated into landscape-level models. (Relevant to long-term outcomes 3 and 5 and initiatives 1.2 and 2.3)

- Demonstration projects are intended to move science and technologies from the lab to practical application with positive GHG impacts. In one demonstration project, the University of Alberta, in collaboration with the Alberta company, GrowSafe, will test the performance of beef cattle bred for their efficient use of feed in field conditions, linking feeding behaviours to GHG outputs through innovative measurement strategies. (Relevant to long-term outcomes 2, 3, and 4 and initiatives 1.1 and 2.5)

- A proof of concept focusing on land disturbance, restoration, and ecosystem services was completed with Silvacom Ltd., the Oil Sands Leadership Initiative, the Alberta Biodiversity Monitoring Institute, Alberta Innovates Technology Futures, and other stakeholders. The purpose of the initiative was to understand the processes, data, and information required to offset land disturbance through reclamation, biodiversity offsets, and other instruments. (Relevant to long-term outcomes 1, 2, and 5 and initiatives 2.3 and 2.5)

- The BioResource Information Management System, Phase 2, was initiated by AI Bio, Silvacom Ltd., and Green Analytics Corp., working with the Agriculture Financial Services Corporation and industrial stakeholders. The concept of Phase 1, which was completed, was to integrate various biomass data from across Alberta's public and private lands. With Phase 2, researchers are working to use Spatial Data Warehouse, a public-private partnership, as the operational platform for data management and distribution. (Relevant to long-term outcome 5 and initiative 2.2)

- Working with the Alberta Livestock and Meat Agency, AI Bio continued to support the Alberta Biodiversity Monitoring Institute as the scientific network coordinator to develop an ecosystem services assessment protocol. This strategic initiative is demonstrating specific applications of new ecosystem services knowledge, including credible, unbiased scorecards of environmental performance, and integrated land-use planning. (Relevant to long-term outcomes 1, 2, and 3 and initiative 2.1)

- The Conservation Offset Workshop hosted by Alberta Innovates Technology Futures and funded by AI Bio was held in November for a cross-section of industrial, non-government organization, and government stakeholders to share critical success factors identified by global experts for establishing an effective offset system in Alberta. (Relevant to long-term outcomes 1 and 5 and initiatives 2.6 and 2.7)

- In collaboration with the Canadian Oil Sands Innovation Alliance and Alberta Innovates Energy and Environment Solutions, AI Bio invested in the Alberta Biodiversity Chairs Program. The two chairs at the University of Alberta are working toward understanding the relationships between industrial development and biodiversity, developing land management strategies, and developing strategies and tools for biodiversity restoration. (Relevant to long-term outcomes 1 and 2 and initiatives 2.5, 2.6, and 2.7)

- AI Bio concluded its pilot collaboration on the Alberta Innovation Voucher Program, which is managed by Alberta Innovates Technology Futures. The aim for AI Bio was to enable early-stage life sciences businesses to assess the feasibility of their business ideas. In total, 14 life sciences projects were funded. Results included competitor analyses, examinations of regulatory environments, technology feasibility studies, and patentability examinations for specific business ideas. (Relevant to long-term outcome 4 and initiative 2.5)

- As at March 31, 2014, the Ecosystem Services team was managing 22 active projects, including 12 in the area of biological management of GHGs.

Business Line: Prion and Prion-Like Neurological Diseases

Goal 5: Effective Management of Prion and Prion-Like Neurological Diseases

Long-Term Outcomes

1. Robust Canadian livestock markets
2. Reduced risk management costs of prion diseases in livestock industries and wild cervid management
3. Research leadership in prion and human neurodegenerative diseases

Initiatives

1. Develop an improved understanding of the processes involved in prion disease to inform risk management and policy around managing these diseases
2. Target investment toward problems of livestock industries and wildlife managers to enable a reduction in industry costs, more effective disease control in the wild, and development of new products
3. Build on Alberta's strengths and opportunities to develop new insight into prion-like neurodegenerative diseases, with the potential for long-term application in prevention, treatment, and products
4. Build on Alberta's expertise in prion and protein misfolding research to strengthen Alberta's position as an international leader in these fields
5. Attract additional funding to leverage AI Bio's investment in prions

Results Category	Performance Measure	Actual Results 2013–14
Projects	The number of projects, programs, or initiatives supported by AI Bio, for which the final report was received by the end of 2013 or which are otherwise considered closed, and which were evaluated for achievement of outputs or outcomes as reported in the table below	11
Immediate Outcomes		
Knowledge that is likely to lead to a new or improved product, process, or service, or improved market access	The number of potential or actual patents, licence agreements, registrations, etc.	5
Knowledge that is likely to lead to practice change	The number of potential or actual changes in practice	4
Knowledge that is likely to lead to policy or regulation change	The number of potential or actual changes in policy or regulation	4
Immediate Outputs		
Highly qualified personnel developed through our projects, programs, and initiatives	The number of individuals involved on a project, program, or initiative who are supported by a grant or contract and who are undergraduate students, graduate students, post-doctoral fellows, or post-secondary graduates with a diploma or	118

	degree	
Knowledge management that occurred with industry, government, and others	Over the life of a project, program, or initiative, the number of seminars or workshops coordinated, presentations delivered, articles published in non-academic publications, newsletter editions issued, active websites developed, crop walks or tours coordinated, etc. for which the audience was from industry, government, or other sectors	20
Knowledge management that occurred with academia	Over the life of a project, program, or initiative, the number of published peer-reviewed papers, abstracts; book chapters, or scientific conference program or poster presentations; or other endeavours for which the audience was mainly from academia	138

Prion and Prion-like Neurological Diseases — Key Achievements in 2013–14

- Stefanie Czub, a leading prion researcher with the University of Calgary and Canadian Food Inspection Agency and one of the top recruits to Alberta, received the 2013 ASTech Foundation Award for Outstanding Leadership in Alberta Science. (Relevant to long-term outcome 1 and initiative 4)

- A project at the University of Alberta discovered that the cellular prion protein is reduced early on in many types of prion infections. This finding suggests a host protective response and a new point of intervention to slow down the progress of prion diseases. (Relevant to long-term outcomes 1, 2, and 3 and initiatives 1, 2, and 4)

- Collaborators at the University of Alberta determined a 3-D structure of the prion to identify a site where antibodies could bind to the prion molecule. (Relevant to long-term outcomes 2 and 3 and initiatives 1, 2, and 4)

- Even though we have learned much about prions, the misfolded proteins that cause diseases like BSE, we know only a little about the normal prion protein, which is found in many species. Researchers at the University of Alberta are using zebra fish to study this protein because they allow for many experiments to be done quickly. This year, the researchers found evidence that the zebra fish protein is connected with an important function involved in nerve impulses. (Relevant to long-term outcome 2 and initiatives 2, 3, and 5)

- Prions exist in different strains, and these influence how they behave and which animals they might infect. The strains differ in their 3-D structures. University of Calgary research found that there are differences in structure and stability between the prion types from BSE, which can be detected using simple tests. (Relevant to long-term outcomes 1, 2, and 3 and initiatives 1, 2, 4, and 5)

- Researchers at the University of Calgary found a means to detect chronic wasting disease prions in urine. (Relevant to long-term outcomes 1, 2, and 3 and initiatives 1, 2, and 4)

- Researchers at the University of Alberta studied ways to promote bacterial degradation of specified risk materials. These techniques might allow for composting of these materials in the future. (Relevant to long-term outcomes 2 and 3 and initiatives 2, 4, and 5)

- It is important to know whether plants might take up prions through their roots systems and be a potential means of transmission of prion diseases. In a study with wheat plants, Alberta researchers found that prions essentially were not taken up into the plants through the root systems. (Relevant to long-term outcomes 2 and 3 and initiatives 1, 2, 4, and 5)

- In order to prevent or slow the conversion of normal prion proteins into infectious prions, an infectious prion has to come in contact with a normal protein. University of Calgary researchers have determined ways in which the sites for these interactions can be identified in cells. This sort of information is needed to find means to slow or stop disease progress after infection. (Relevant to long-term outcomes 1, 2, and 3 and initiatives 1, 2, and 4)

- Development of an effective vaccine might help reduce the spread of chronic wasting disease. The process of developing vaccines for prions is more complicated than for a usual infection because the prion agent comes from a normal protein. The Vaccine and Infectious Disease organization in Saskatoon has tested ways to develop vaccines based on small but important structural differences between the normal and infectious prion molecules. (Relevant to long-term outcomes 1, 2, and 3 and initiatives 1, 2, and 4)

- The Alberta Prion Research Institute hosted PRION 2013, the world's largest annual scientific meeting on prion and prion-like protein misfolding diseases, May 25–29 in Banff, Alberta. More than 400 researchers, students, post-doctoral fellows, clinicians, industry members, and policy-makers from around the world attended. The scientific program included four and a half days of workshops and lectures on the following themes: prion diseases in animals, prion and prion-like diseases in humans, protein structure, and socioeconomic impact. This open scientific congress welcomed researchers from a broad spectrum of disciplines, creating an interdisciplinary approach to solving problems in the prion research field. (Relevant to long-term outcomes 2 and 3 and initiatives 1, 2, 3, 4, and 5)

- A partnership with the Rio de Janeiro Research Federation (FAPERJ) and the São Paulo Research Federation (FAPESP), two of the largest state research funding agencies in Brazil, was formed in 2013–14. Together, the three funding agencies hosted the Brazil-Canada Workshop on Prion and Prion-like Diseases. Twenty-five researchers from Brazil and Canada presented their latest research findings while 18 young researchers from Alberta and British Columbia presented scientific posters. The Prion Institute will partner with FAPERJ and FAPESP to host a second workshop in Brazil in the autumn of 2014. (Relevant to long-term outcomes 1, 2, and 3 and initiatives 1, 2, 3, 4, and 5)

- The Alberta Prion Research Institute also formed a partnership with the German Center for Neurodegenerative Diseases in 2013–14. Recent evidence shows that the protein misfolding that occurs in prion diseases is similar to the protein misfolding that occurs in human neurodegenerative diseases such as Alzheimer's and Parkinson's. (Relevant to long-term outcomes 2 and 3 and initiatives 1, 2, 3, 4, and 5)

- Fei Wang, research associate at the Ohio State University, presented lectures at the University of Alberta and the University of Calgary. Dr. Wang received the Alberta Prion Research Institute Young Researcher Prize. This $25,000 prize is awarded to a young researcher who is the lead author of the peer-reviewed paper deemed to be most likely to have a profound impact on prion research. Dr. Wang won the prize for his paper "Generating a prion with bacterially expressed recombinant prion protein." (Relevant to long-term outcomes 2 and 3 and initiatives 1 and 4)

- The Expanding Horizons Program was launched in 2013–14. This professional development program will provide graduate students and post-doctoral fellows with access to coaching and mentoring. Providing young researchers with training outside of the lab setting will make them more well-rounded and knowledgeable researchers. It will also equip them with valuable skills that are transferrable to careers in government, industry, or other sectors. (Relevant to long-term outcomes 2 and 3 and initiatives 1, 3, and 4)

- Work continued on the new prion and virology research centre at the University of Calgary. The Alberta Prion Research Institute provided infrastructure funding to build the facility. When completed in 2014,

this dedicated prion research facility will have significant impacts on the research being done in Calgary. (Relevant to long-term outcomes 2 and 3 and initiatives 1, 2, 3, 4, and 5)

- The Alberta Prion Research Institute once again partnered with Jay Ingram, former host of *Daily Planet* and *Quirks and Quarks*, to host The Prion Diaries. More than 300 Albertans attended public lectures in Edmonton, Calgary, and Fort McMurray. Four funded researchers participated in the lectures to inform Albertans about the prion research being done in Alberta. (Relevant to long-term outcomes 1, 2, and 3 and initiatives 1, 2, 3, and 4)
- The Alberta Prion Research Institute continued its funding partnership with the Alberta Livestock and Meat agency and developed a new one with the Robert Koch Institute. (Relevant to long-term outcome 3 and initiative 5)

Separate Grant Agreements

Activities in support of the Advanced Materials and Chemicals Program, the Biological GHG Management Program and Alberta Prion Research Institute are funded via separate grant agreements from Alberta Innovation and Advanced Education, which is outside of AI Bio's grant from this ministry. Separate reports will be submitted to the department specific to the Advanced Materials and Chemicals Program and the Alberta Prion Research Institute. For the Biological GHG Management Program, a separate detailed business plan will be submitted to the CCEMC.

6. Management's Discussion and Analysis

The results presented in AI Bio's audited financial statements are shaped by our mandate from the Government of Alberta: to provide leadership and coordination for research and innovation that support the growth and diversification of Alberta's agriculture, forest, and related life sciences sectors. In our fourth full year of operation, the wide-ranging expertise of our Board has guided our allocation of research funding in our priority areas of sustainable production, food innovation, bioindustrial innovation, ecosystem services, and prion and prion-like neurological diseases. AI Bio continues to operate in alignment with its corporate bylaws, code of conduct policy, conflict of interest policy, and intellectual property practice.

We have been able to establish valuable partnerships with provincial, national, and international agencies that align with our interests and the needs of our stakeholders. We have been careful stewards of the resources of our shareholder, leveraging funding from industry, government, and Alberta Innovates partners. Alberta's $26-billion (2012 sales) agriculture, food, and forest sectors represent a remarkable economic engine that will continue to grow in the face of global interest in food security, green technology, environmental sustainability, water scarcity, and healthy societies.

In the 2013–14 financial statements, the Statement of Financial Position shows net assets of $8.483 million and cash and cash equivalents of $16.655 million, which includes (but is not limited to) $4.053 million in cash for the Alberta Prion Research Institute. Cash has decreased by $2.964 million from the 2012–13 reported balance. Because we are able to retain resources into other fiscal years, we can plan for longer-term opportunities in our areas of focus. The $4.232-million increase over last year in unearned revenue is primarily due to a number of partners' increased investment in AI Bio for specific programming.

In the 2013–14 Statement of Operations, revenues of $17.865 million were received and $21.837 million in expenses were committed, resulting in a net operating deficit of $3.972 million, which reduces the operating surplus ($12.455 million) carried forward from previous years.

7. Operational Overview

AI Bio supports innovation at different stages of the innovation spectrum to grow and diversify industries in Alberta's agriculture, food, and forest sectors. Its mandate ranges from discovery of new knowledge to application of that knowledge and includes knowledge translation or commercialization in five priority areas of science and innovation: sustainable production, food innovation, advancing the bioeconomy, ecosystem services, and prion and prion-like neurological diseases. During the 2013–14 year, we renamed our bioeconomy business line "bioindustrial innovation."

Alberta Innovates is the province's only group of organizations with a pan-Alberta legislative mandate to fund and perform research, innovation, and commercialization in multiple sectors. We report to the Minister of Innovation and Advanced Education—as do Alberta's post-secondary research institutions, enhancing alignment and collaboration on many levels. While the Alberta Innovates corporations are assigned responsibility for advancing research and innovation in discrete sectors, AI Bio partners with its Alberta Innovates colleagues in areas of common interest. These areas include water, food and beverage innovation and food safety, bioproducts, greenhouse gas mitigation, land reclamation, climate change, ecosystem services, and health.

Strategic collaboration is one cornerstone of AI Bio's operations. Connections and relationships enhance our ability to build on each other's strength, increase access to unique capacity, leverage resources, and avoid duplication. We routinely seek partners with expertise and capacity to deliver results. Each business line within AI Bio works with its partners in unique, creative ways. In addition to our Alberta Innovates collaborations, we work with partners in the private sector, academia, non-governmental organizations, and governments (municipal, provincial, and federal).

As of March 31, 2014, AI Bio has been managing 155 active projects focused on providing the knowledge, tools, and technologies to support the agriculture, food, and forestry industries in Alberta. This investment portfolio of more than $58 million over the lifetime of our active projects spans a wide array of research in priority areas. The projects range from measuring biodiversity to developing cross-laminated timber, from livestock genomics and biomass-based automobile parts to nutritional benefits of Alberta-grown vegetable oils.

AI Bio has followed the guidance provided by the Government of Alberta (GOA) on appropriate policies and procedures for transparency in reporting expenses for both its Board and senior management. AI Bio now publicly discloses travel, hospitality, and working session expenses for Board members and executive team members in accordance with the GOA Public Disclosure of Travel, Meal and Hospitality Expense. In 2013–14, we also fully adopted the GOA policy on salary disclosure.

Over the last year, we had changes in staffing, welcoming Ginni Braich, Mikie Fong, and Jelena Sapkovskaya and saying goodbye to Katrina Cooper and Mitch Andrew.

Also this year, the term of Board member Dr. Jackie Shan expired. We appreciate Dr. Shan's significant contribution to our Board and to the corporation.

AI Bio acknowledges the GOA's stated intent to continue to improve the relevance, effectiveness, and efficiency of the province's innovation system, and we continue to work with the GOA in pursuing this goal. Our programs and partnerships have demonstrated a history of good choices, and we expect to continue delivering needed research and innovation in Alberta. We submit this annual report in the belief that it describes the initiatives and investments that Alberta's agriculture, food, and forest industries require to be profitable and competitive—no matter what the architecture of Alberta's innovation ecosystem looks like in the future.

Alberta Innovates Bio Solutions

8. Audited Financial Statements

AUDITOR GENERAL *Alberta*

Independent Auditor's Report

To the Board of Directors of Alberta Innovates—Bio Solutions

Report on the Financial Statements

I have audited the accompanying financial statements of Alberta Innovates—Bio Solutions, which comprise the statement of financial position as at March 31, 2014, and the statements of operations and cash flows for the year then ended, and a summary of significant accounting policies and other explanatory information.

Management's Responsibility for the Financial Statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with Canadian public sector accounting standards, and for such internal control as management determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

Auditor's Responsibility

My responsibility is to express an opinion on these financial statements based on my audit. I conducted my audit in accordance with Canadian generally accepted auditing standards. Those standards require that I comply with ethical requirements and plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

I believe that the audit evidence I have obtained is sufficient and appropriate to provide a basis for my audit opinion.

Opinion

In my opinion, the financial statements present fairly, in all material respects, the financial position of Alberta Innovates—Bio Solutions as at March 31, 2014, and the results of its operations, its remeasurement gains and losses, and its cash flows for the year then ended in accordance with Canadian public sector accounting standards.

ORIGINAL SIGNED BY: Merwan N. Saher, FCA

Auditor General

May 27, 2014

Edmonton, Alberta

ALBERTA INNOVATES – BIO SOLUTIONS

FINANCIAL STATEMENTS

MARCH 31, 2014

Statement of Operations

Statement of Financial Position

Statement of Cash Flows

Notes to the Financial Statements

Schedule 1 – Expenses Directly Incurred Detailed by Object

Schedule 2 – Salary and Benefits Disclosure

Schedule 3 – Related Party Transactions

Schedule 4 – Allocated Costs

ALBERTA INNOVATES - BIO SOLUTIONS
STATEMENT OF OPERATIONS
YEAR ENDED MARCH 31, 2014

	2014 Budget (Note 3)	2014 Actual	2013 Actual
	(in thousands)		
Revenues			
Government of Alberta Grants	$ 18,510	$ 16,362	$ 18,813
Investment Income	200	258	263
Other Revenue	1,140	1,245	1,028
	19,850	17,865	20,104
Expenses - Directly Incurred (Note 2, Schedules 1 and 4)			
Administration	1,950	1,490	1,668
Prion & Protein Misfolding Diseases	5,059	3,863	5,300
Sustainable Production	3,796	3,232	2,634
Advancing the Bioeconomy	7,706	7,815	3,858
Food Innovation	3,029	2,391	1,203
Ecosystem Services	2,927	3,046	1,970
New Investments	500	-	-
	24,967	21,837	16,633
Annual Operating Surplus (Deficit)	$ (5,117)	$ (3,972)	$ 3,471
Accumulated Surplus, Beginning of year		12,455	8,984
Accumulated Surplus, End of year		$ 8,483	$ 12,455

The accompanying notes and schedules are part of these financial statements.

ALBERTA INNOVATES - BIO SOLUTIONS
STATEMENT OF FINANCIAL POSITION
AS AT MARCH 31, 2014

	2014	2013
	(in thousands)	
Assets		
Cash (Note 4)	$ 16,655	$ 19,619
Accounts Receivable	4,222	517
	$ 20,877	$ 20,136
Liabilities		
Accounts Payable and Accrued Liabilities	$ 1,276	$ 795
Deferred Revenue (Note 5)	11,118	6,886
	12,394	7,681
Net Assets		
Accumulated Operating Surplus	8,483	12,455
	$ 20,877	$ 20,136

Contractual obligations (Note 7)

The accompanying notes and schedules are part of these financial statements.

Approved by the Board of Directors:

ORIGINAL SIGNED BY: Brian Hesje

Director — May 27, 2014 Date

ORIGINAL SIGNED BY: Art Froehlich

Director — May 27, 2014 Date

ALBERTA INNOVATES - BIO SOLUTIONS
STATEMENT OF CASH FLOWS
YEAR ENDED MARCH 31, 2014

	2014	2013
	(in thousands)	
Operating Transactions		
Annual Operating (Deficit) Surplus	$ (3,972)	$ 3,471
(Increase) Decrease in Accounts Receivable	(3,705)	884
Increase (Decrease) in Accounts Payable and Accrued Liabilities	481	(672)
Increase in Deferred Revenue	4,232	2,674
Cash Provided by (Applied to) Operating Transactions	(2,964)	6,357
Increase (Decrease) in Cash	(2,964)	6,357
Cash, Beginning of Year	19,619	13,262
Cash, End of Year	$ 16,655	$ 19,619

The accompanying notes and schedules are part of these financial statements.

ALBERTA INNOVATES – BIO SOLUTIONS

NOTES TO THE FINANCIAL STATEMENTS

MARCH 31, 2014

NOTE 1 AUTHORITY AND PURPOSE

Alberta Innovates – Bio Solutions (the Corporation) is a Provincial Corporation, as defined in the *Financial Administration Act*, that was established on January 1, 2010 and operates under the authority of the *Alberta Research and Innovation Act*. The objectives of the Corporation are to support, for the economic and social well-being of Albertans, bio-industries research and innovation activities aligned to meet Government of Alberta priorities, including, without limitation, activities directed at the development and growth of the bio-industries sector, the discovery of new knowledge and the application of that knowledge.

The Corporation is exempt from income taxes under the *Income Tax Act*.

NOTE 2 SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES AND REPORTING PRACTICES

These financial statements are prepared in accordance with Canadian Public Sector Accounting Standards.

The measurement of certain assets and liabilities is contingent upon future events; therefore, the preparation of these financial statements requires the use of estimates, which may vary from actual results. Management uses judgment to determine such estimates. In management's opinion, the resulting estimates are within reasonable limits of materiality and are in accordance with the significant accounting policies summarized below.

a) Basis of Financial Reporting

Revenue accounting policy

All revenues are reported on the accrual basis of accounting. Cash received for which goods or services have not been provided by year end is recorded as deferred revenue.

Government Transfers

Transfers from the Government of Alberta, federal and other governments are referred to as government transfers.

Government transfers and the associated externally restricted investment income are recorded as deferred revenue if the terms for use of the transfer, or the terms along with the Corporation's actions and communications as to the use of the transfer, create a liability. These transfers are recognized as revenue as the terms are met and, when applicable, the Corporation complies with its communicated use of the transfer.

NOTE 2 SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES AND REPORTING PRACTICES (Cont'd)

All other government transfers, without terms for the use of the transfer, are recorded as revenue when the Corporation is eligible to receive the funds.

Other Revenue
Other revenue includes the reimbursement of expenses from other organizations.

Investment Income
Investment income includes interest income and is recorded on the accrual basis where there is reasonable assurance as to its measurement and collection.

Expenses

Directly Incurred
Directly incurred expenses are costs the Corporation has primary responsibility and accountability for. In addition to program operating expenses such as salaries, supplies, etc., directly incurred expenses also include:

- pension costs which are the cost of employer contributions for current service of employees during the year, and
- valuation adjustments representing the change in management's estimate of future payments arising from obligations relating to vacation pay.

Grants are recognized as expenses when authorized, and eligibility criteria, if any, are met.

Incurred by Others
Services contributed by other entities in support of the Corporation's operations have not been recorded in the financial statements and are disclosed in Schedule 4.

Valuation of Financial Assets and Liabilities

The Corporation's financial assets and liabilities are generally measured as follows:

Financial Statement Component	Measurement
Cash	Cost
Accounts Receivable	Amortized Cost
Accounts Payable and Accrued Liabilities	Amortized Cost

The Corporation has no assets or liabilities in the fair value category, has not engaged in foreign currency transactions and has no remeasurement gains or losses. Consequently, no statement of remeasurement gains or loss has been provided.

NOTE 2 SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES AND REPORTING PRACTICES (Cont'd)

Assets

Financial assets are assets that could be used to discharge existing liabilities or finance future operations and are not for consumption in the normal course of operations. Financial assets of the Corporation are limited to financial claims, such as advances to and receivables from other organizations, employees and other individuals.

Net Assets

Net assets represent the difference between the carrying value of assets held by the Corporation and its liabilities.

Canadian Public Sector Accounting Standards require a "net debt" presentation for the statement of financial position in the summary financial statements of governments. Net debt presentation reports the difference between financial assets and liabilities as "net debt" or "net financial assets" as an indicator of the future revenues required to pay for past transactions and events. The Corporation operates within the government reporting entity, and does not finance all its expenditures by independently raising revenues. Accordingly, these financial statements do not report a net debt indicator.

Liabilities

Liabilities are recorded to the extent that they represent present obligations as a result of events and transactions occurring prior to the end of fiscal year. The settlement of liabilities will result in sacrifice of economic benefits in the future.

b) Future Accounting Changes

PS 3260 Liability for Contaminated Sites
In June 2010 the Public Sector Accounting Board issued this accounting standard effective for fiscal years starting on or after April 1, 2014. Contaminated sites are a result of contamination being introduced into air, soil, water, or sediment of a chemical, organic, or radioactive material, or live organism that exceeds an environmental standard. The corporation would recognize a liability related to the remediation of such contaminated sites subject to certain recognition criteria. Management does not expect the implementation of this standard to have a significant impact on the financial statements in the next fiscal period.

NOTE 3 BUDGET
(in thousands)

A business plan with a budget deficit of $5,117 was approved by the Board on March 27, 2013 and the full financial plan was submitted to the Minister of Innovation and Advanced Education.

NOTE 4 CASH
(in thousands)

Cash in the amount of $16,655 (2013 - $19,619) include deposits in the Consolidated Cash Investment Trust Fund (CCITF) of the Province of Alberta. The CCITF is administered by the Ministry of Treasury Board and Finance with the objective of providing competitive interest income to depositors while maintaining appropriate security and liquidity of depositors' capital.

The portfolio is comprised of high-quality short-term and mid-term fixed-income securities with a maximum to maturity of three years. As at March 31, 2014, securities held by the Corporation had a time-weighted return of 1.2% per annum (2013: 1.3% per annum). Due to the short-term nature of CCITF investments, the carrying value approximates fair value.

NOTE 5 DEFERRED REVENUE
(in thousands)

Deferred revenue represents unexpended, externally restricted funds.

	2014			2013
	Prion Research	Other	Total	Total
Balance, beginning of year [1]	$ 3,304	$ 3,582	$ 6,886	$ 4,212
Grants received - Government of Alberta	5,589	4,040	9,629	8,384
Grants received - Other	75	-	75	475
Investment Income	50	-	50	54
Recognized as Revenue				
Investment Income	(50)	-	(50)	(54)
Grants from Government of Alberta	(3,436)	(1,855)	(5,291)	(6,060)
Grants from other	(181)	-	(181)	(125)
Balance, end of year	$ 5,351	$ 5,767	$ 11,118	$ 6,886

[1] $945 reallocated between Prion and Other categories in order to reflect the correct balances by project. Total opening balance did not change.

NOTE 6 BENEFIT PLANS
(in thousands)

The Corporation participates in the multi-employer pension plans: Management Employees Pension Plan (MEPP), the Public Service Pension Plan (PSPP), as well as, a Supplementary Pension Plan (SRP) for Public Service Managers. The Corporation does not have sufficient plan information on MEPP, PSPP or the SRP to follow the standards for defined benefit accounting and therefore follows the standard for defined contribution accounting. Accordingly the pension expense for these pension plans is equivalent to the annual contributions of $396 (2013 - $348).

At December 31, 2013, the Management Employees Pension Plan reported a surplus of $50,457 (2012 – deficiency $303,423), the Public Service Pension Plan reported a deficiency of $1,254,678 (2012 – deficiency $1,645,141) and the Supplementary Retirement Plan for Public Service Managers reported a deficiency of $12,384 (2012 – deficiency $51,870). The Corporation is not responsible for future funding of the plan deficit other than through contribution increases.

NOTE 7 CONTRACTUAL OBLIGATIONS
(in thousands)

Contractual obligations are obligations of the Corporation to others that will become liabilities in the future when the terms of those contracts or agreements are met.

	2014	2013
Obligations under contracts and grants	$ 18,313	$19,977

Estimated payment requirements for each of the next five years are as follows:

	Contracts	Grants	Total
2014-15	$ 350	$ 10,988	$ 11,338
2015-16	102	5,617	5,719
2016-17	23	958	981
2017-18	-	275	275
	$ 475	$ 17,838	$ 18,313

NOTE 8 APPROVAL OF FINANCIAL STATEMENTS

These financial statements were approved by the Board of Directors.

ALBERTA INNOVATES - BIO SOLUTIONS
YEAR ENDED MARCH 31, 2014

Schedule 1 - Expenses Directly Incurred Detailed by Object

	2014		2013
	Budget	Actual	Actual
	(in thousands)		
Grants	$ 19,152	$ 16,744	$ 11,259
Salaries, Wages & Employee Benefits	3,115	3,145	3,001
Supplies and Services	2,700	1,948	2,373
	$ 24,967	$ 21,837	$ 16,633

Schedule 2 - Salary & Benefits Disclosure

Year ended March 31, 2014

	2014				2013
	Base Salary [1]	Other Cash Benefits [2]	Other Non-Cash Benefits [3]	Total	Total
	(in thousands)				
Chairman of the Board	$ -	$ 31	$ 1	$ 32	$ 42
Board Members	-	22	1	23	46
Chief Executive Officer	250	7	81	338	322
Executives:					
Executive Director, Ecosystem Services	174	-	54	228	218
Executive Director, Sustainable Production & Food Innovation	185	-	57	242	231
Executive Director, Prion [4]	169	-	-	169	168
Executive Director, Advancing the Biocconomy	166	-	50	216	208
Executive Director, GHG Management Program	196	-	5	201	200
Director, Operations	118	-	36	154	146

(1) Base salary includes pensionable base pay.

(2) Other cash benefits include honoraria for Board Members and car allowance for Chief Executive Officer. No bonuses were paid in 2013 or 2014.

(3) Other non-cash benefits include employee benefits and contributions or payments made on behalf of employees including pension and supplementary retirement plan, health care, dental coverage, group life insurance, short and long term disability plans, Workers Compensation Board premiums, accomodations, learning account items, health spending account items and professional memberships.

(4) Base compensation is established through contractual agreement. No other cash or non cash benefits are provided.

Schedule 3 - Related Party Transactions

Year ended March 31, 2014

Related parties are those entities consolidated or accounted for on a modified equity basis in the Government of Alberta's financial statements.

Entities in the Ministry refers to entities consolidated in the Ministry of Innovation and Advanced Education. Other entities outside of the Ministry relates to the remaining entities consolidated at the Provincial level.

Alberta Innovates - Bio Solutions had the following transactions with related parties which are recorded on the Statements of Operations and the Statements of Financial Position at the amount of consideration agreed upon between the related parties:

	Entities in the Ministry		Other Entities Outside of the Ministry	
	2014	2013	2014	2013
	(in thousands)			
Revenues				
Grants	$ 15,848	$ 18,762	$ 514	$ -
Other	169	294	15	97
	$ 16,017	$ 19,056	$ 529	$ 97
Expenses – Directly Incurred				
Grants	$ 10,177	$ 7,149	$ 425	$ 236
Other Services	157	69	3	3
	$ 10,334	$ 7,218	$ 428	$ 239
Receivables from	$ 3,502	$ 24	$ 545	$ -
Payables to	$ 774	$ 259	$ 46	$ 18
Deferred Revenue	$ 8,906	$ 4,586	$ 1,969	$ 1,950
Contractual Obligations	$ 12,661	$ 12,845	$ 840	$ 325

The above transactions do not include support service arrangement transactions disclosed below.

The Corporation also had the following transactions with related parties for which no consideration was exchanged. The amounts for these related party transactions are estimated based on the costs incurred by the service provider to provide the service.

These amounts are not recorded in the financial statements. Accommodation expenses incurred by others are disclosed in Schedule 4.

	Other Entities Outside of the Ministry	
	2014	2013
	(in thousands)	
Expenses – Incurred by Others		
Accommodation (1)	$ 250	$ 204

(1) The Corporation's share of accommodation costs is based on the proportion of space occupied compared to the total space occupied by all Ministries.

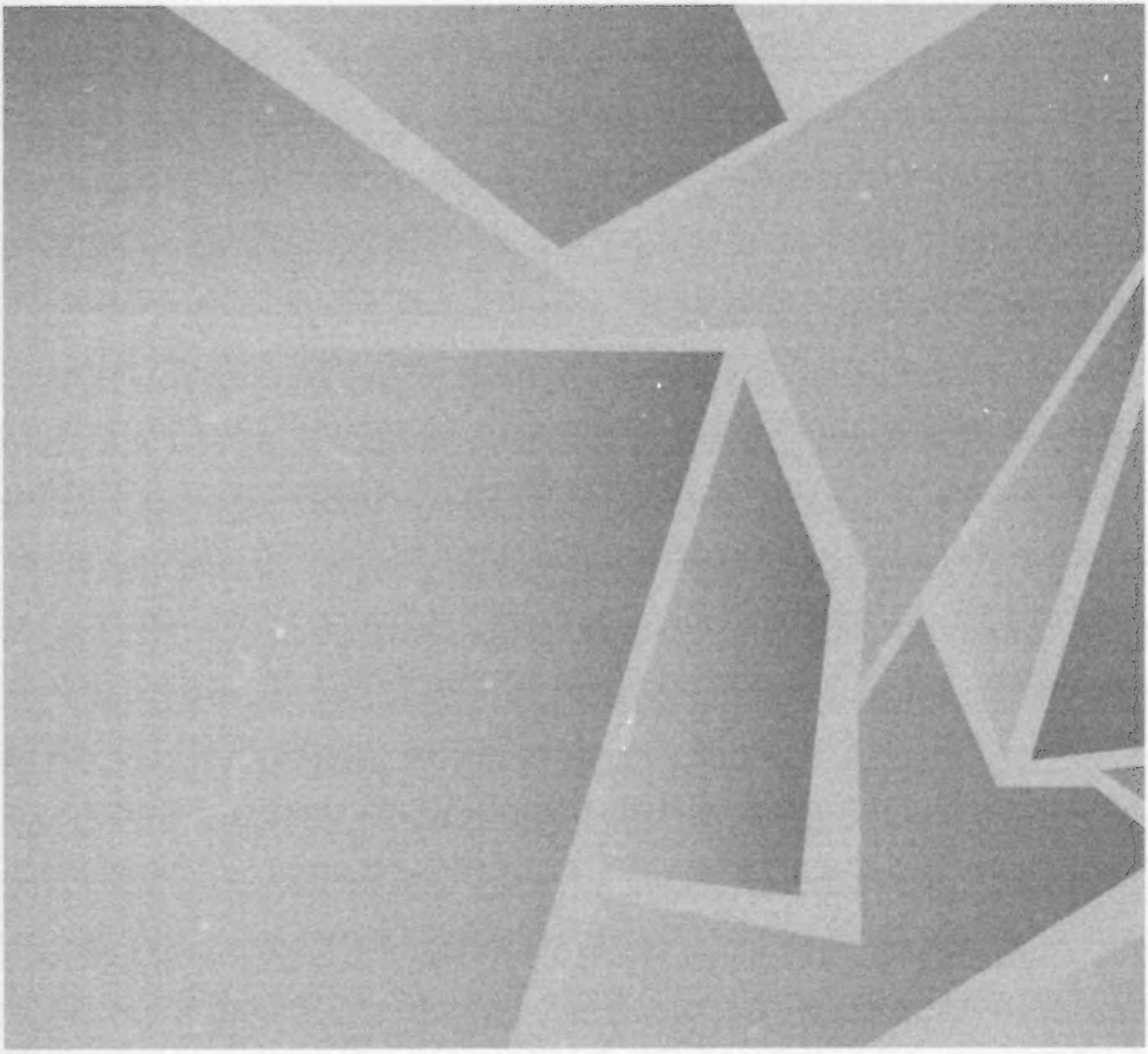
Schedule 4 - Allocated Costs

Year ended March 31, 2014

	2014			2013
		Expenses incurred by others [2]		
	Expenses [1]	Accommodation Costs	Total Expenses	Total Expenses
	(in thousands)			
Program				
Administration	$ 1,490	$ 250	$ 1,740	$ 1,872
Prion & Protein Misfolding Diseases	3,863	-	3,863	5,300
Sustainable Production	3,232	-	3,232	2,634
Advancing the Bioeconomy	7,815	-	7,815	3,858
Food Innovation	2,391	-	2,391	1,203
Ecosystem Services	3,046	-	3,046	1,970
	$ 21,837	$ 250	$ 22,087	$ 16,837

[1] Expenses – Directly Incurred as per Statement of Operations.

[2] The Corporation receives financial processing and reporting services from the Department of Innovation and Advanced Education at no cost. The dollar value of these services cannot be accurately determined.



ALBERTA INNOVATES BIO SOLUTIONS

18th Floor, Phipps McKinnon Building, 10020-101 A Avenue
Edmonton, Alberta, Canada T5J 3G2
780-427-1956
bio@albertainnovates.ca

www.bio.albertainnovates.ca